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# Grevillea,

A QUARTERLY RECORD OF

## CRYPTOGAMIC BOTANY

AND ITS LITERATURE.

EDITED BY G. MASSEE.



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## BOOKS AND EXTRACTS RECEIVED.

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- J. E. HUMPHREY, D. Sc. *The Saprolegniaceæ of the United States, with notes on other species.*  
,, Report of the Massachusetts State Agricultural Experiment Station, 1892.
- T. HUSNOT. *Muscologia Gallica*, livr. 11.
- Prof. O. PENZIG. *Atti del Congresso Botanico Internazionale di Genoa*; 1892.
- A. S. HITCHCOCK, M.Sc. Preliminary report on rusts of grain; Bull. No. 38, Kansas experiment Station.
- P. A. SACCARDO. *Il Numero delle Piante.*  
,, *I nomi generici dei Funghi e la riforma del Dr. O. Kuntze.*
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- J. B. ELLIS and B. M. EVERHART. *New Species of North American Fungi from various localities.*  
,, and J. DEARNESS. *New Species of Canadian Fungi.*
- S. NAWASCHIN. *Über die Brandkrankheit der Torfmoose.*

# Grevillea.

A QUARTERLY RECORD OF CRYPTOGAMIC BOTANY  
AND ITS LITERATURE.

## CONTRIBUTION A L'ÉTUDE DES MUCORINÉES.

AVEC ESSAI D'UNE MONOGRAPHIE DE CES CHAMPIGNONS.

Par Dr. A. DEWEVRE.

*Caractères généraux de la famille.*—On comprend aujourd'hui parmi les Mucorinées, tous les champignons unicellulaires\* (au moins jusqu'au moment de la formation de leur renflement sporangial), terrestres, qui vivent sur les substances en décompositions, les excréments, parfois sur des champignons ou des écorces, plus rarement encore sur des végétaux phanérogames. Leur reproduction se fait sexuellement ou asexuellement par les procédés suivants.

La reproduction asexuelle, qui est la plus fréquente s'effectue principalement par des *spores*, petits corps reproducteurs endogènes, contenus dans une poche ordinairement arrondie, parfois elliptique ou allongée, que l'on nomme *sporange*. Ces spores sont toujours dépourvues de cils et sont toujours immobiles. Elle peut encore se faire, soit à l'aide de *chlamydospores*, amas de protoplasme intercalés entre deux cloisons sur le parcours des tubes aériens ou mycéliens, soit au moyen de *stylospores* ou *conidies* lesquelles sont d'origine exogène.

Ce dernier mode de reproduction asexuelle, de même que celui par chlamydospores et celui par bourgeonnement (formes levures des Mucorinées) ne se rencontrent que dans certains genres seulement; la reproduction sporangiale seule est commune à tous les genres.

La sexualité ou tout au moins ce que l'on considère comme telle est représentée par les *zygospores*, productions résultant de la fusion

\* On définit souvent les Mucorinées comme étant des champignons unicellulaires, cela est inexact; elles ne restent ordinairement unicellulaires que pendant une partie de leur existence. Jusqu'au moment de la formation du sporange. Par l'âge ces cryptogames prennent presque toujours des cloisons, aussi bien dans le mycélium que dans les filaments. J'ai pu constater ce fait dans tous les genres à peu près, Mucor, Circinella, Piptocephalis, Syncephalis, Mortierella, etc., même chez certains Pilobolus.



d'une partie du protoplasme de deux rameaux dont les extrémités viennent se souder l'une à l'autre et dont les membranes se résorbent au point de jonction, pour permettre le mélange des protoplasmes.

Ce sont des masses, sphériques, à surface lisse ou hérissée de protubérances, parfois cachées par un chevelu de filaments, maintenues entre deux bras nommés suspenseurs.

Lorsqu'il n'y a qu'un seul bras l'on a une *azygospore*.

La reproduction par zygospores a été trouvée dans le plus grand nombre des genres de la famille, il en est toutefois, comme les genres *Chaetostylum*, *Circinella*, *Pirella*, *Helicostylum*, *Syncephalastrum*, *Herpocladium* où l'on n'en a encore vu aucunes traces. Pour les autres genres il est un bien grand nombre d'espèces où la reproduction sexuelle n'a jamais été observée.

A part quelques exceptions peu nombreuses, on peut dire que la reproduction sexuelle est très rare.

Les causes présidant à la formation des zygospores ont été recherchées bien des fois, mais jusqu'à présent l'on n'est arrivé à rien de positif à ce sujet.

Les nombreuses recherches que j'ai faites pour tâcher de déterminer ces causes incitatrices m'ont amené à croire que leur production dépend surtout de questions de races.

L'Habitat des Mucorinées, leur structure et leurs modes de reproduction suffisent à les caractériser nettement et permettent de les séparer de tous les autres groupes de champignons.

### *Classement dichotomique des genres.*

I. Champignons pourvus de sporanges ordinairement globuleux, jamais cylindriques allongés, toujours solitaires à l'extrémité des rameaux.

A. Sporangies monosporés, petits, dépourvus de columelle, courtement pédicellés et insérés à quelques uns sur des rameaux plus ou moins élargis; rameaux stériles prolongés en pointe.

*Chaetocladiées.*

B. Sporangies polysporés.

BB' Sporangies pourvus d'une columelle bien nette, tout au moins dans les grands sporanges.

a. Champignons possédant à la fois des sporanges et des conidies, sur deux appareils différents. Ils vivent sur des plantes phanérogames . . . *Chounéphorées.*

b. Champignons ayant des sporanges seulement, pas, d'appareil conidifère. Ils vivent sur des excréments des substances organiques en décomposition, parfois sur des cryptogames.

α. Tubes fructifères toujours simples, à sporanges s'ouvrant par une zone annulaire diffuente, située au point d'attache du sporange à la columelle. . . . . *Pilobolées.*

1. Tube fructifère toujours pourvu de deux renflements, l'un sous sporangial, l'autre basillaire; sporange projeté à la maturité en entraînant avec lui sa columelle. . . . . *Pilobolus*.
  2. Tube fructifère ne présentant jamais qu'un seul renflement situé à son sommet et encore celui-ci est caché à l'intérieur du sporange où il forme columelle, comme chez les Mucors. Après la déhiscence, la columelle devient apparente et reste attachée à la tige. Le sporange n'est pas projeté, mais grâce à une courbure du filament fructifère, il est amené contre le substratum sur lequel il adhère. . . . . *Pilaira*.
- β. Tubes fructifères simples ou ramifiés, sporanges entièrement diffuents ou s'ouvrant par déchirure, mais jamais par diffuence d'une zone déterminée.
- \* Mucorinées dont la végétation est définie, c'est à dire que, arrivées à un certain degré de développement maximum, elles cessent de croître.
- † Les sporanges sont d'une seule sorte.
1. Les filaments fructifères sont ramifiés dichotomiquement. Zygosporés fréquentes, portées par les rameaux aériens. . . . . *Sporodinia*.
  2. Filaments fructifères simples ou ramifiés, mais autrement que dichotomiquement.
  - a. Mycélium situé à l'intérieur du substratum, incolore, celui qui est à l'extérieur est brun, souvent épineux. Tubes fructifères simples, spores colorées; zygosporés fréquentes. . . . . *Spinellus*.
  - b. Mycélium jamais épineux, tubes fructifères simples ou rameux.
    - b<sup>1</sup>. Filaments fructifères grands, normalement simples colorés en verdâtre ou en olivâtre, brillants. . . . . *Phycomyces*.
    - b<sup>2</sup>. Filaments fructifères plus petits, souvent ramifiés, jamais verdâtres ou olivâtres. Zygosporés sphériques, à surface garnie de mamelons, maintenues entre deux suspenseurs droits, sensiblement égaux. . . . . *Mucor*.
- †† Les sporanges sont de deux sortes, les uns grands, les autres petits.
1. Spores semblablement conformées dans les deux sortes de sporanges.
    - a. Pédicelles des sporangioles, circonés. . . . . *Helicostylum*.
    - b. Pédicelles des sporangioles droits:
      - b<sup>1</sup>. Rameaux se bifurquant un certain nombre de fois et se terminant par un sporangiole oligospore, . . . . . *Thamnidium*

- b<sup>2</sup>. Ramifications nonen dichotomie, branches principales terminées en pointe stérile, vers leur milieu elles présentent ordinairement un renflement sur lequel viennent s'attacher des sporangioles oligosporées . . . . . *Chaetostylum*.
2. Spores différemment conformées dans les deux sortes de sporanges; celles des grands sporanges sont elliptiques, celles des petits sont réniformes, *Dicranophora*.
- \*\* Végétation indéfinie, sporanges d'une seule sorte.
- a. Champignons pourvus de stolons qui s'allongent dans un plan parallèle à la surface du substratum. Membrane des sporanges diffuente.
- a<sup>1</sup>. Stolons droits, rampant et produisant à leur extrémité un ou plusieurs filaments sporangifères. Spores ordinairement rayées longitudinalement . *Rhizopus*.
- a<sup>2</sup>. Stolons arqués, ne produisant des tubes sporangifères qu'au milieu de l'arc qu'ils forment. Spores jamais rayées . . . . . *Absidia*.
- b. Champignons non stolonifères, s'accroissant en hauteur. Sporanges à membrane non diffuente.
- b<sup>1</sup>. Ramification en sympode, rameaux circinés; columelle cylindro-conique ou plus ou moins piriforme, sporanges globuleux . . . . . *Circinella*.
- b<sup>2</sup>. Ramification sympodique, avec rameaux circinés; columelle en forme d'urne renversée, sporanges piriformes . . . . . *Pirella*.
- BBB. Sporanges dépourvus de columelle, une cloison peu marquée située à l'extrémité du tube fructifère en tient parfois lien  
Mortièrellées.
- a. Sporanges situés à l'extrémité du tube principal ou de rameaux qui sont toujours dressés. Tube sporangifère plus large à la base qu'au sommet, parfois égal. Croissance du champignon limitée.
- a. Mycélium formé de filaments blancs anastomosés, tube fructifère tantôt simple, tantôt ramifié en grappe ou en candélabre, mais jamais en ombelle . . . . . *Mortièrella*.
- β. Mycélium non anastomosé, ramification en ombelle  
Carnoya (gen. nov.).
- b. Sporanges situés à l'extrémité de rameaux latéraux recourbés ou spirales, tube principal d'un diamètre égal dans toute son étendue, se terminant en une pointe stérile, champignons grimpant, à croissance indéfinie  
Herpocladium.
- II. Champignons pourvus de sporanges cylindriques, allongés, très étroits, réunis souvent en très grand nombre à l'extrémité plus ou moins renflée des rameaux . . . . . *Cephalidées*.



- a. Champignons simples ou présentant une simple bifurcation à leur extrémité (une seule espèce est dans ce cas). Tubes fructifères fortement renflés à leur sommet en une vésicule globuleuse ou ovoïde, sur laquelle viennent s'insérer les sporanges . . . *Syncephalis*.
- b. Champignons ramifiés.
  - α. Dichotomiquement, extrémité des dichotomies occupée par une cellule petite en comparaison du renflement des *Syncephalis*, sur laquelle s'attachent les sporanges . . . *Piptocephalis*.
  - β. Autrement qu'en dichotomies, le renflement situé au sommet des rameaux est gros et ressemble à celui des *Syncephalis*. Mycélium ramifié, non anastomosé . . . *Syncephalastrum*.

*Affinités des genres de cette famille.*

Tous les genres dont nous venons de donner les caractères principaux, présentent entre eux des points de ressemblance qui permettent de les rapprocher les uns des autres et de constituer ainsi un tableau dans lequel les divers genres sont groupés d'après leurs affinités plus ou moins grandes. Voici à mon avis comment ces rapports doivent être établis.

Le genre *Mucor* me paraît être le groupe pivot auquel par l'intermédiaire de ses nombreuses espèces on peut rattacher les divers genres qui constituent la famille des Mucorinées.

Les affinités de ces derniers ne sont pas toujours faciles à établir, ce qui est dû à ce qu'un grand nombre de termes intermédiaires manquent, soit parce qu'ils ne sont pas encore connus, soit parce qu'ils n'existent plus ; mais tous, aussi différents qu'ils puissent être présentent cependant des caractères de parenté indéniables.

Une première tribu, celles des *Pilobolées*, groupe bien distinct, bien caractérisé vient se raccorder aux *Mucors*, par le genre *Pilaira*, surtout par le *Pilaira Caesatii*. Le *Pilaira dimidiata* marque une étape vers les *Pilobolus*, il se rapproche particulièrement du *Pilobolus nanus*.

Une autre tribu bien caractérisée, elle aussi, nous est présentée par les *Cephalidées*, comprenant les genres *Syncephalastrum*, *Syncephalis* et *Piptocephalis*. Des trois le genre qui a le plus de caractères mucoréens est celui des *Syncephalastrum*, dont le port, la ramification, le mycélium non anastomosé est identique à celui des *Mucors*. Une forme anormale du *Syncephalastrum elegans* trouvée par Mr. Em. Marchal \* dans ses cultures rappelait, comme parallélisme le champignon que j'ai dénommé *Carnoya capitata*.

Les *Syncephalis* ont un appareil fructifère identique à celui des *Syncephalastrum* ce qui établit entre ces deux genres un caractère de famille bien net.

Les *Piptocephalis* diffèrent assez fortement de ces deux genres ;

\* Em. Marchal, 1892, Bull. Soc. Belge de Microscopie, Nos. VI. et VII., p. 124, fig. 1 à 4.

ils possèdent en commun avec eux l'appareil sporangifère et jusqu'à un certain point l'appareil sexuel. Par contre, leur ramification dichotome, leurs cannelures, etc., les en éloignent beaucoup, on peut toutefois faire remarquer que le *Syncephalis furcata* montre une bifurcation, ce qui indique que là aussi, la ramification (quand elle existe), a une tendance à se faire dichotomiquement.

Le genre *Piptocephalis* me paraît avoir eu la même origine que les *Syncephalis*, mais dans la suite, les descendants ont évolué, séparément dans deux directions différentes, d'où sont résulté les différences assez profondes que l'on observe entre ces genres.

Des Mucors simples, on peut faire dériver d'une part les *Spinellus* et les *Phycomyces*, d'autre part la tribu des *Mortierellées* comprenant les genres *Mortierella*, *Herpocladium* et *Carnoya*. Tout ce groupe étant quelque peu en relation avec les *Syncephalis*, par l'intermédiaire des *Mortierella* qui possèdent un mycélium diéchetomis et anastomosé, analogue à celui de ce genre. De tous, le plus rapproché des Mucors est le genre *Spinellus* qui, à part la couleur, a tout à fait leur aspect; à celui-ci se rattache directement le genre *Phycomyces*, également coloré et comme lui, ressemblant très fortement à un Mucor, à tel point que jadis on l'y avait placé et dénommé comme tel. Ce qui distingue surtout ces deux genres des Mucors vrais, ce sont leurs zygospores, qui chez le *Spinellus* se produisent très facilement et sont d'une forme quelque peu différente; celles du *Phycomyces* s'éloignent énormément de celles des Mucors, et de celles des *Spinellus*, elles se rapprochent beaucoup plus des zygospores des *Mortierella* et des *Absidia*, genres dont les organes reproducteurs d'origine sexuelle, sont construits à peu près d'après le même modèle, c'est à dire que c'est une sphère comprise entre deux bras et recouverte par des prolongements qui partent de ceux-ci.

Le genre *Mortierella* même a déjà par lui-même d'assez grandes affinités avec les Mucors, mais les genres *Carnoya* et *Herpocladium*, ses voisins, en ont encore bien plus car leur mycélium ressemble à celui des Mucors; il n'est en effet ni anastomosé ni bifurqué comme celui des *Mortierella*.

Ce mycélium anastomosé existe aussi chez les *Syncephalis* ce qui crée un point de ressemblance entre ces deux groupes; par leurs zygospores les *Mortierella* ont des affinités avec les genres *Phycomyces* et *Absidia*.

Les *Thamnidium* ont comme quelques autres genres (*Helicostylum*, *Chaetostylum*), conservés une partie de leurs caractères ancestraux, tel est le cas du gros sporange qui porte l'extrémité du filament principal des *Thamnidium*; sporange qui est tellement semblable à celui du *Mucor mucedo*, que Mr. de Bary avait considéré ce champignon comme une forme du *Mucor mucedo*. Il possède de plus des rameaux verticillés se ramifiant dichotomiquement, particularité qui lui crée des relations avec les Mucors ramifiés en corymbe, en ombelle et en verticille, au même titre que le *Chaeto-*

cladium. Les zygosporos des *Thamnidium* sont du même modèle que celles des *Mucors*.

Enfin le genre *Thamnidium* possède encore de nombreux points de ressemblance avec les genres *Chætostylum* et *Helicostylum*.

Des *Mucors* rameux paraissent dériver un grand nombre de genres : il y a tout d'abord à citer la lignée *Rhizopus* et *Absidia*, deux genres présentant entre eux beaucoup de points de contacts.

Les zygosporos des *Absidia* diffèrent toutefois beaucoup de celles du *Rhizopus*, elles sont du type *Mortierella*, tandisque celles du *Rhizopus* ont plutôt de l'analogie avec celles des *Mucors*.

Les *Mucors* formant la transition entre ces deux genres et les *Mucors* plus simples, sont des espèces telles que le *Mucor corymbosus*, etc., ainsi que les *Mucors* verticillés dont on ne connaît pas jusqu'à présent de représentants. Certains rameaux de ces *Mucors* se seraient redressés et auraient constitué les filaments sporangifères, tandisque d'autres se seraient transformés en crampons. Les mêmes *Mucors* constitueraient aussi un des premiers pas vers les *Chætocladiées*, les autres intermédiaires nous étant encore inconnus. Cette tribu des *Chætocladiées*, n'a guère que des rapports extrêmement éloignés avec quelques rares genres ; son plus proche voisin est le genre *Chætostylum*.

Le *Mucor bifidus* me semble être le premier intermédiaire de la série qui a donné naissance au genre *Sporodinia*.

Les champignons de ce genre sont comme on sait très fortement dichotomisés et présentent de nombreux caractères mucoréens, je ne leur connais pas d'autres affinités.

Enfin le groupe assez bien fourni des *Mucors* circinés, pourrait bien avoir été la souche des *Circinella* et des *Pirella*, genres dont l'origine est vraisemblablement commune, mais qui dans la suite des temps ont évolué un peu différemment.

Les *Circinella* se rapprochent tellement des *Mucors* proprement dits, que certains auteurs, Schröter entre autres, les y fait rentrer. Entre le *Mucor circinelloïdes* et le *Circinella simplex*, il n'y a du reste, pas une bien grande distance. Il serait intéressant de découvrir leurs zygosporos, afin de voir si, de ce côté là aussi, leurs caractères sont ceux des *Mucors*.

Le genre *Helicostylum* a de nombreuses affinités ; son gros sporange terminal est identique à celui du *Mucor mucedo*, ses chlamydosporos le rapprochent des *Mucors*, ses sporangioles ressemblent à ceux des *Thamnidium* et du *Chætostylum* ; par la circinellation des pédicelles de ses sporangioles, il fait penser aux *Bircinella*, aux *Pirella* et aux *Mucors* circinés ; enfin l'*Absidia* repens s'interpose entre les *Helicostylum* et les *Absidia* vrais.

Le genre *Dicranophora* récemment indiqué par Mr. Schröter est encore si peu connu qu'il est fort difficile de déterminer exactement ses affinités. On peut toutefois dire qu'il est proche parent des *Thamnidium*, *Chætostylum* et *Helicostylum* car il possède comme eux, deux sortes de sporanges ; seulement, ici au lieu que les spores soient égales dans les deux sortes de sporanges, elles sont



inégales. De plus ses zygosporos ont deux bras très nettement inégaux, ce qui n'existe pas chez le *Thamnidium*, le seul des genres précités où les organes sexuels sont connus ; il s'en suivrait donc que ce genre serait plus élevé en organisation que les autres. Mr. Fischer le rapproche du *Mucor heterogamus* de Vuillemin où la copulation se fait au moyen de deux branches inégales.

Il nous reste maintenant à parler d'un groupe fort intéressant celui des Choanéphorées qui par sa constitution, ses zygosporos, ses chlamydosporos et ses sporanges, appartient aux Mucorinées, mais qui par sa forme conidienne se rattache aux Mucédinées, et à certains Ascomycètes.

*Affinités de la famille.*—Les Mucorinés sont très proches des Chytridiacées terrestres, des *Synchytrium* notamment, avec lesquels elles ont de nombreux points de ressemblance.

Diverses Mucorinées rappellent certaines Mucédinées et Ascomycètes.

Enfin nous, savons que placés dans des conditions déterminées, certaines espèces donnent naissance à des formes levures qui se multiplient par bourgeonnement comme les levures véritables.

(*a suivre.*)

## LICHENES.

### INDEX LICHENUM BRITANNICORUM.

By THE REV. J. M. CROMBIE, F.L.S.

### PART III.

(Continued from Vol. XIX., p. 70.)

Sub-Tribe V. **Lecideei**, Nyl.

Genus I. **LECIDEA** (Ach.), Nyl.

A. **GYALECTA**, Ach.

- Sp. 1 *L. exanthematica* (Sw.), Nyl.
- 2 *L. cupularis*, Ach.
- 3 *L. ascaridiella*, Nyl.
- 4 *L. foveolaris* (Whlbn.), Nyl.
- 5 *L. geioica* (Whlbn.) Nyl.
- 6 *L. carneolutea* (Turn.), Nyl.
- 7 *L. carneola*, Ach.
- 8 *L. truncigena* (Ach.), Nyl.
- 9 *L. Flotovii* (Krb.), Carroll.
- 10 *L. congruella*, Nyl.
- 11 *L. lutea* (Dicks.), Borr.  
f. *sublobulata*, Cromb.



- 12 *L. pineti* (*Schrad.*), *Ach.*  
    *f. leucostigma* (*Leight.*).
- 13 *L. chrysophæa* (*Pers.*), *Nyl.*
- 14 *L. pallida* (*Pers.*), *Nyl.*  
    *β. Biatora* (*Fr.*), *Nyl.*  
    *a. Stirps, L. luridæ.*
- 15 *L. lurida* (*Sw.*), *Ach.*  
    *f. pallescens* (*Fr. fil.*), *Cromb.*
- 16 *L. globifera*, *Ach.*
- 17 *L. rhizobola*, *Nyl.*
- 18 *L. rubiformis*, *Whlbn.*
- 19 *L. testacea* (*Hffm.*), *Ach.*
- 20 *L. glaucolepidea*, *Nyl.*  
    *b. Stirps, L. vernalis.*
- 21 *L. cinnabarina*, *Smmrf.*
- 22 *L. mutabilis*, *Fée.*
- 23 *L. lucida*, *Ach.*  
    *f. theiotea*, *Ach.*
- 24 *L. clavulifera*, *Nyl.*  
    *f. subviridicans*, *Nyl.*
- 25 *L. guerneæ*, *Ach.*
- 26 *L. phæops*, *Nyl.*  
    *f. major*, *Cromb.*
- 27 *L. lithophiliza*, *Nyl.*
- 28 *L. coarctata* (*Sw.*), *Nyl.*  
    *f. 1, elacista* (*Ach.*).  
    *2, cotaria* (*Ach.*).  
    *β. glebulosa* (*Sw.*), *Cromb.*  
    *f. microphyllina* (*Fr.*).  
    *γ. ornata* (*Smmrf.*), *Nyl.*  
    *δ. ocrinata* (*Ach.*), *Nyl.*
- 29 *L. prærimata*, *Nyl.*  
    *L. Bruyeriana* (*Schær.*), *Leight.*
- 30 *f. ochrodes*, *Nyl.*
- 31 *L. arridens*, *Nyl.*
- 32 *L. atrorufa* (*Dcks.*), *Ach.*
- 33 *L. Taylori* (*Schw.*), *Mudd.*
- 34 *L. Walrothii*, *Flk.*
- 35 *L. decolorans* (*Hffm.*), *Flk.*  
    *β. desertorum* (*Ach.*).
- 36 *L. flexuosa* (*Fr.*), *Nyl.*  
    *f. æruginosa* (*Borr.*), *Leight.*
- 37 *L. gelatinosa*, *Flk.*
- 38 *L. viridescens* (*Schrad.*), *Nyl.*
- 39 *L. Lightfootii* (*Sw.*), *Ach.*  
    *β. commutata* (*Ach.*), *Schær.*
- 40 *L. uliginosa*, *Ach.*
- 41 *L. humosa* (*Ehrb.*), *Nyl.*
- 42 *L. fuliginea*, *Ach.*, *Nyl.*

- 43 *L. perobscura*, *Nyl.*
- 44 *L. epimarta*, *Nyl.*
- 45 *L. calcivora* (*Ehrb.*), *Nyl.*
- 46 *L. Metzleri* (*Krb.*), *Nyl.*
- 47 *L. chondrodes*, (*Map.*), *Nyl.*
- 48 *L. sanguineoatra*, (*Ach.*), *Nyl.*
- \* *L. atrofusca* (*Sw.*), *Nyl.*
- 49 *L. fusca* (*Schær.*), *Nyl.*
- 50 *L. valentior*, *Nyl.*
- 51 *L. indigula*, *Nyl.*
- 52 *L. ochracea* (*Hepp.*), *Nyl.*
- 53 *L. fuscorubeus*, *Nyl.*
- 54 *L. botryiza*, *Nyl.*
- 55 *L. paucula*, *Nyl.*
- 56 *L. subturgidula*, *Nyl.*
- 57 *L. deducta*, *Nyl.*
- 58 *L. vernalis* (*L.*), *Nyl.*
- 59 *L. meiocarpa*, *Nyl.*
- 60 *L. subduplex*, *Nyl.*
- 61 *L. tenebricosa*, (*Ach.*), *Nyl.*
- 62 *L. ochrococca*, *Nyl.*
- 63 *L. cuprea* (*Smmrf.*), *Nyl.*
- 64 *L. Berengeriana* (*Mass.*), *Nyl.*
- \* *L. cupreiformis* (*E. Nyl.*), *Nyl.*
- $\beta$ . *perilenciza*, *Nyl.*
- $\gamma$ . *lecanodes*, *Nyl.*
- 65 *L. sylvana* (*Krb.*), *Nyl.*
- 66 *L. amaurospoda* (*Anri.*), *Nyl.*
- 67 *L. symmictella*, *Nyl.*
- 68 *L. Henrica*, *Laubal.*
- 69 *L. mæstula*, *Nyl.*
- 70 *L. submæstula*, *Nyl.*
- 71 *L. turgidula*, *Fr.*
- f. *erumpens*, *Nyl.*
- $\beta$ . *pityophila* (*Smmrf.*), *Nyl.*
- f. *endopella* (*Leight.*), *Nyl.*
- 72 *L. misella*, *Nyl.*
- 73 *L. semipallens*, *Nyl.*
- c. *Stirps*, *L. globulosæ.*
- 74 *L. globulosa*, *Flk.*
- 75 *L. chlorotiza*, *Nyl.*
- 76 *L. holomoloides*, *Nyl.*
- 77 *L. denigrata* (*Fr.*), *Nyl.*
- f. *pyrenothizans*, *Nyl.*
- 78 *L. hemipoliella*, *Nyl.*
- $\beta$ . *Semialbula*, *Nyl.*
- 79 *L. subnigrata*, *Nyl.*
- 80 *L. spodiza*, *Nyl.*
- 81 *L. Ehrhartiana*, *Ach.*

- 82 *L. erysiboides*, *Nyl.*
- 83 *L. prasina* (*Fr.*), *Schær.*
- 84 *L. prasiniza*, *Nyl.*
- 85 *L. micrococca* (*Krb.*), *Nyl.*
- 86 *L. sordidescens*, *Nyl.*
- 87 *L. lutcella*, *Nyl.*
- 88 *L. antrophila*, *Larbal.*  
d. *Stirps*, *L. intermixtæ.*
- 89 *L. intermixta*, *Nyl.*
- 90 *L. atropurpurea* (*Schær.*), *Nyl.*
- 91 *L. atropurpurascens*, *Nyl.*
- 92 *L. subsphæroides*, *Nyl.*
- 93 *L. Arnoldi* (*Krph.*), *Nyl.*
- 94 *L. delutula*, *Nyl.*
- 95 *L. subviridescens*, *Nyl.*
- 96 *L. Stereocaulorum*, *Fr. fil.*  
e. *Stirps*, *L. cyrtellæ.*
- 97 *L. cyrtella*, *Ach.*
- 98 *L. Bouteillei* (*Desmarz.*), *Nyl.*
- 99 *L. baeomma*, *Nyl.*
- \* *L. glaucocarnea*, *Nyl.*
- 100 *L. littorella*, *Nyl.*
- 101 *L. cæsirolepra*, *Nyl.*
- 102 *L. Griffithii* (*Sw.*), *Cromb.*  
f. *limitata*, *Cromb.*
- 103 *L. tenera*, *Nyl.*  
f. *explanatula*, *Nyl.*
- 104 *L. Heerii* (*Hepp.*), *Nyl.*

(*To be continued.*)

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*Additions to the Lichen Flora of the West Riding of Yorkshire.* A. Shackleton and T. Hebden, "The Naturalist," 1893, p. 165.—It is highly satisfactory to find that in Yorkshire we have two students so thoroughly interested in the study of lichens as the authors of the above-named article have proved themselves to be, one result of their researches being the addition of 118 species to the Lichen Flora of the West Riding. Many notes and points of interest in connection with the discrimination of species must have cropped up in preparing the work, and one cannot but regret that some of these were not introduced, as such give a ring of life to an otherwise bald list, and more especially when we call to mind the extreme brevity of many Nylanderian diagnoses.

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## FUNGI.

## REVISED DESCRIPTIONS OF TYPE SPECIMENS IN THE KEW HERBARIUM.

Numerous species of fungi established by Berkeley and others, the types of which are deposited in the Kew Herbarium, were described at a time when external characters, habit, etc., were considered as being equally important, or even more so, than internal microscopic features; consequently, at this age, when the pendulum has swung to the opposite extreme, and characters are mostly founded on colour, size, and septation of spores, the old species are not recognized, the result being that many such are being again described as new species. The above are the principal reasons for redescribing old types, and it is much to be desired that everyone having an opportunity of examining types—by which is meant the actual specimen from which the original description was drawn up—would give a new description of such, in accordance with the usage of modern times, embodying not only microscopic features, but also external characteristics, habit, etc. Host, matrix, and microscopic measurements are undeniably very important factors in the discrimination of species, but their abuse in modern times has probably resulted in as great an evil as did their absence from the descriptions of the old authors.

***Hysterium fusiger*, B. & C.**

Perithecia gregarious, usually irregularly grouped on a black patch or stain; black, 1-2 mm. long, elliptical, ends acute, straight, curved, or flexuous, median line not gaping, even after prolonged soaking, lips smooth; asci cylindrical or somewhat clavate, attenuated into a thin pedicel at the base, spores 8, irregularly biserial, somewhat fusiform, 7-9 septate, very slightly constricted at the septa, sometimes curved, cells usually 1-guttulate, pale, dull brown,  $50-60 \times 8-10 \mu$ ; paraphyses numerous, equal to or slightly exceeding the asci in length, filiform, tip not at all incrassated, brownish.

*Hysterium fusiger*, B. & C., Grev., Vol. iv., p. 11; Sacc. Syll., Vol. ii., No. 5661.

On dead wood. New England. Sprague, No. 5830.

***Hysterium capparidis*, B. & C.**

Hypophyllous; perithecia gregarious, erumpent, black, at first covered with bright brown powder, straight or rarely slightly curved, narrow, rather prominent, slit very narrow; asci subcylindrical, shortly stipitate, 8-spored; spores irregularly biserial, cylindric-fusoid, uniformly septate; transverse septa 9-11, very close together,  $36-40 \times 6-7 \mu$ , with a tinge of brown at maturity; paraphyses very numerous, wavy, filiform, septate.

*Angelina capparidis*, B. & C., in Herb.



On leaves of *Capparis Jamaicensis*. Cuba.

I am not aware of the existence of any previously published description of this species.

***Glonium cyrillæ*, B. & C.**

Scattered, black, erumpent, broadly elliptical, usually laterally compressed towards the apex, up to 1 mm. long, slit very narrow, lips varying from striate to quite smooth; asci broadly clavate, somewhat truncate at the apex, base abruptly narrowed into a short, oblique pedicel, 8-spored; spores irregularly biseriate, cylindrical, slightly curved, ends very obtuse (sausage-shaped), 1-septate, the septum situated one-third the distance from the base, slightly or not at all constricted, colourless, with a hyaline border,  $65-75 \times 8-10 \mu$ ; paraphyses numerous, filiform throughout, often slightly wavy.

*Hysterium cyrillæ*, B. & C., Grev., Vol. iv., p. 11.

*Glonium cyrillæ*, B. & C., Sacc. Syll., Vol. xi., No. 5593.

*Hysterium chlorinum*, B. & C., Grev., Vol. iv., p. 12.

*Glonium chlorinum*, B. & C., Sacc. Syll., Vol. xi., No. 5595.

On twigs of *Cyrilla*, Car. Inf., and on twigs of *Quercus aquatica*, Alabama.

Examination of the type specimens proves the two species cited above to be identical. I have seen free spores agreeing in form and size with those described above, having 3 septa, and pale brown. This is probably the mature condition of the spores of this species, although I have not seen such in an ascus. The measurements of the spores given by Saccardo are erroneous, and furthermore are not correct translations of Berkeley's measurements. Ellis, N. Amer. Pyren., pp. 684-685, has apparently copied Saccardo's errors.

***Glonium clusiæ*, B. & C.**

Gregarious; often, but not always, in patches, producing no discoloration of the leaf; perithecia immersed, blackish, linear, straight or curved, and sometimes triradiate, 1-1.5 mm. long; asci cylindrical, base attenuated, 8-spored; spores obliquely uniseriate, elliptic-oblong, ends very obtuse, 1-septate, not constricted at the septum or only very slightly, clear brown,  $14-16 \times 6 \mu$ ; paraphyses linear, very slightly thickened upwards.

*Hysterium clusiæ*, B. & C., Journ. Linn. Soc., Vol. x., p. 372.

*Glonium clusiæ*, B. & Br., Sacc. Syll., Vol. ii., No. 5608.

On dead leaves of *Clusiæ parasitica*. Cuba.

***Glonium tardum*, Berk.**

Gregarious; perithecia broadly elliptical or often almost circular in outline, nearly plain, smooth and even, black, remaining for a long time intact, then opening by a very minute, short slit; asci broadly clavate, shortly stipitate, 8-spored; spores irregularly biseriate, broadly elliptical with a medium septum, not at all constricted, colourless; paraphyses not seen, probably absent.

*Hysterium tardum*, Berk., Fl. Tasm., ii., p. 281.

*Glonium tardum*, Berk., Sacc. Syll., ii., No. 5607.

On leaves of *Cyathodes straminea*, Tasmania. Described as *Hyst. tardum*, but entered as *Hyst. cyathodes*, B., in Berkeley's Herbarium.

***Hypoderma rufilabrum*, B. & C.**

Gregarious, reddish-brown, sometimes, but not constantly, seated on a pale spot; perithecia commencing as circular patches beneath the epidermis, then elongating transversely to axis of branch, becoming elliptical, slightly or not at all convex, slit very narrow, lips thin, up to  $1.5 \times .5$  mm.; asci rather broadly clavate, narrowed into a slender pedicel; spores 8, irregularly bi-seriate or inordinate, cylindrical or very slightly fusiform, ends obtuse, straight or slightly curved,  $14-17 \times 1.5 \mu$ , colourless; paraphyses filiform, rather closely septate, exceeding the asci in length.

*Hysterium rufilabrum*, B. & C., Grev., Vol. iv., p. 12.

*Hypoderma rufilabrum*, Duby., Hyst., p. 40, t. 2, f. 21 (spores rather too thick); Sacc. Syll., ii., No. 5796.

On twigs of *Acer striatum*. Car. Inf.

***Hypoderma variegatum*, B. & C.**

Innate; scattered or somewhat gregarious, sometimes becoming confluent, black; perithecia straight, rarely somewhat wavy or branched, smooth, lips very close together, slightly raised like a keel; asci clavate; spores fasciculate, filiform, ends abruptly obtuse, colourless, nearly as long as the ascus,  $45-50 \times 1.5 \mu$ ; paraphyses absent.

*Hysterium variegatum*, B. & C., Grev., Vol. iv., p. 12.

*Hypoderma variegatum*, Duby., Hyst., p. 43; Sacc. Syll., Vol. ii., No. 5786.

On twigs of *Andromeda acuminata*, Car. Sup. Also on *Andromeda coriacea*, and *Viburnum opulus*, Car. Inf., petioles of *Aralia spinosa*, Look Out Mt., Tennessee.

***Lophodermium platylacum*, B. & C.**

Gregarious in large clusters on pale patches on both sides of the leaf, but most numerous and often confined to the upper surface; perithecia black, straight or wavy, sometimes branching, 1-3 mm. long, often much larger and anastomosing when growing on the larger veins; disc with a brown or yellow tinge, slightly raised and gaping when old; asci narrowly cylindrical, 8-spored, base attenuated; spores fasciculate, filiform, tips slightly attenuated,  $70-80 \times 1.5 \mu$ , colourless; paraphyses filiform, very numerous, tinged brown at the apex.

*Hysterium platylacum*, B. & C., Journ. Linn. Soc., Vol. x., p. 372.

*Lophodermium platylacum*, B. & C., Sacc. Syll., ii., No. 5812.

On dead leaves of *Clusia*. Cuba.

This species, on leaves of *Clusia*, occurs in Herb. Lindig, No. 2891. New Granada.

**Lophodermium Petersii, B. & C.**

Scattered, not seated on a discoloured spot; perithecia elongated and wavy, elliptical or circular in outline, at first covered by the cuticle, then bursting through, disc broadly open when moist, pallid, margin elevated, black, compact; asci cylindric-clavate, attenuated at the base, spores elongated, filiform, straight or very slightly curved,  $55-68 \times 1.5 \mu$ , colourless; paraphyses very numerous, agglutinated together, filiform, straight, equal to the asci in length.

*Hysterium Petersii*, B. & C., Grev., Vol. iv., p. 13.

*Lophodermium Petersii*, B. & C., Sacc. Syll., Vol. ii., No. 5822.

On cedar. Alabama, Peters.

The perithecia are large, 4-5 mm. long when elongated, 2-3 mm. across when more or less circular.

**Lophodermium velatum, Berk.**

Gregarious, crowded on small pale spots; perithecia blackish, flattened and covered by the cuticle, smooth, about 5 mm. long, uniform in size, the long axis in all instances parallel to the long axis of the stem of host; asci broadly cylindrical, terminating abruptly in a very short, oblique stem; apex somewhat acute, 8-spored; spores fasciculate, nearly as long as the ascus, with a spiral twist, filiform, or with the apex slightly incrassated,  $75-80 \times 1.5 \mu$ ; paraphyses numerous, very slender; apex narrowly clavate, colourless.

*Hysterium velatum*, Berk. in Herb. This species has not been published before, I believe.

On *Festuca*. Madeira.

**Hysterographium hiascens, B. C.**

Scattered, externally black, smooth, margin strongly incurved when dry, expanded and exposing the concave, blackish-olive; disc when dry 1-1.5 mm. across; asci broadly cylindrical, tapering to a thin, oblique pedicel at the base, constantly 4-spored; spores elliptic-oblong, ends very obtuse, muriformly septate, transverse septa usually five, dark, clear brown,  $30 \times 15 \mu$ ; paraphyses very numerous, filiform, simple, or branched; apex olive-brown.

*Hysterium hiascens*, B. & C., Grev., Vol. vi., p. 11.

On dry bark of *Quercus bicolor*, Car. Inf.; on *Celtis occidentalis*, Car. Sup.

**Aulographum quadria, Berk.**

Gregarious, forming small detached clusters of 6-10 individuals; perithecia black, linear, rather prominent, straight or very slightly curved, lips thick, smooth, slips narrow, up to .5 mm. long; asci short, broadly clavate, 8-spored; spores inordinate, elliptic-oblong, ends obtuse, 1-septate, not constricted at the septum, colourless,  $8-10 \times 4.5 \mu$ ; paraphyses filiform, equal to or very slightly longer than the asci.

*Hysterium quadria*, Berk. in Herb. So far as I can ascertain this species has never been published.

On leaves of *Quadria heterophylla*. Chili.



**Pseudographis depressum, B. & C.**

Black, scattered to crowded; perithecia elliptical, flattened above, rugulose or irregularly striate, hymenium covering the entire upper surface; spores broadly cylindrico-clavate, with a very short, slender, oblique pedicel; spores irregularly bi-seriate, 7-11 septate (generally 9), not constricted at the septa, the fourth or fifth cell from the base usually swollen, straight or curved, colourless,  $35 \times 42 \times 6 \mu$ ; paraphyses numerous, filiform, equal, or very slightly incrassated upwards, colourless.

*Hysterium depressum*, Berk. and Curt., Grev., Vol. iv., p. 10; Sacc. Syll., Vol. ii., No. 5660.

On dry exposed wood. Virginian Mountains.

Berkeley says, "Disc extremely narrow," but I find no trace of a slit, the naked hymenium covering the entire surface, neither is there a distinct border.

**Gloniella drynariæ, B. & Br.**

Gregarious, covering the entire under-surface of the frond; perithecia immersed, causing no discoloration, the slightly raised and ruptured cuticle resembling white lips, straight, curved, or rarely branched, 1-2 mm. long; asci cylindrical, shortly stipitate; spores obliquely uniseriate, cylindric-oblong, ends very obtuse, 3-septate, not at all constricted at the septa, colourless,  $14-16 \times 6 \mu$ ; paraphyses filiform, slightly exceeding the asci in length, numerous.

*Hysterium drynariæ*, B. & Br., Journ. Linn. Soc., Vol. xiv., p. 133; Sacc. Syll., Vol. ii, No. 5648.

On fronds of *Drynaria quercifolia*. Tropical Forests, Ceylon.

Very lichenoid in appearance, covering the whole under surface of the frond, accompanied by multitudes of pallid, minute perithecia filled with oblong spores .0002 in. long (*B. & Br.*).

There is no evidence of genetic affinity between the minute perithecia and the *Hysterium*.

**Ostropa albo-cincta, B. & C.**

Densely gregarious; conical or shortly cylindrical; disc black, plane, with a short, very narrow slit; lips smooth; sides densely clothed with white powder; asci sub-cylindrical, shortly stipitate, 8-spored; spores irregularly biseriate, somewhat fusiform, straight or slightly curved, 1-septate, very slightly constricted at the septum, dingy olive-brown;  $30 \times 6-7 \mu$ ; paraphyses numerous, linear, not incrassated upwards.

*Ostropa albo-cincta*, Berk. & Curtis, Journ. Linn. Soc., Vol. x., p. 372; Sacc. Syll., Vol. ii., No. 5856.

On dead bark. Cuba.

Commencing as densely crowded white knobs, which expand at the apex and form a broadly elliptical black disc, furnished with a short, very narrow slit.



## AUSTRALIAN FUNGI.

By G. MASSEE.

***Puccinia Kochiæ*, Mass.**

Amphigenous; sori discoid, plane, very compact, blackish-brown, about 1 mm. diameter, girt by the torn epidermis; teleutospores densely packed, elliptic-oblong, both ends very obtuse, or the apex with a slight indication of a papilla, which is often oblique, perfectly smooth, pale umber,  $40-50 \times 22-25 \mu$ , wall about  $3 \mu$  thick; pedicel colourless, cylindrical,  $70 \times 6 \mu$ .

On *Kochia sedifolia*, F. v. M. Near Dainboola, Victoria (F. Reader).

Very closely resembling *Puccinia alyziæ*, Cke. & Mass., in habit and general appearance, but differing widely in the spore form and structure.

***Xylaria (Xylodactyla) Readeri*, F. von Mueller.**

Black; head globose or broadly elliptical, 5-8 mm. long, crowned by a short spine, mealy with the white conidia; perithecia scanty, large, prominent; asci cylindrical, shortly pedicellate, 8-spored, spores obliquely uniseriate, subcylindrical, slightly curved, ends obtuse,  $14-15 \times 5-6 \mu$ , pale purple-brown; stem 7-10 c.m. long, the greater portion buried in the sand, densely velvety downwards, simple, erect, springing at intervals from a whitish, horizontal rhizome.

Sandy desert. Wemmera, Victoria (F. Reader).

Resembling *X. pedunculata* in habit, but with very different spores.

***Phoma uvicola*, B. & C. N. A. Fungi, No. 382. Sacc. Syll. No. 887.**

Sporules  $7-8 \times 3-4 \mu$ .

Unfortunately this disease, known in the United States as "black rot," has been found on grapes from Victoria, but the ascigerous condition has not been detected in Australia.

## BIBLIOGRAPHY.

*Hedwigia*, 1893, p. 119.—Bresadola states that *Pleurotus abbreviatus*, Kalch. Grev. viii., 152, is equal to *Polyporus subpulverulentus*, B. & C. Pores ample, distorted when dry. This is stated on the faith of some specimen said to be derived from Kalchbrenner. It seems so absurd, on the face of it, that an experienced mycologist like Kalchbrenner did not know a *Pleurotus* from a *Polyporus* that we would much sooner believe in the specimen having a wrong name attached. A similar circumstance has occurred previously (Grev. xix., p. 53), when Bresadola contended, on the faith of some specimen, that *Polyporus pisiformis*, Kalch., was a Gasteromycete. It is improbable that any experienced mycologist would have made such elementary mistakes.—M.C.C.

*Einige neue und interessante Pilze aus dem Königl. Botanischen Museum in Berlin.* P. Hennings, Hedwigia, 1893, p. 61 (1 pl.).

The fungi described are certainly very interesting, but not altogether new. *Puccinia Schottmülleri*, P. Henn., is identical with *Puccinia corticioides*, B. & Br. (Journ. Linn. Soc., Vol. xv., p. 52, pl. 2, figs. 7-8). These authors say of this species in a note:—"At first appearing under the form of little tawny specks; at length forming apricot-coloured patches, which assume the form of some *Corticium*. On the stem of some large graminea, probably *Arun-dinaria*. Kobê, Nippon, Japan."

*Puccinia xylariiformis*, P. Henn., is the same as *Puccinia splendens*, Vize (Grev., Vol. vii., p. 11). The last-named species was founded on a Californian specimen, "On *Obione* or rabbit bush," but unfortunately *Obione* became changed to "onion" in Grevillea, and this mistake is repeated in Sacc. Syll., vii., pt. ii., No. 2257. This species has also been collected in Mexico, on *Hymenoclea* and on *Tessaria*.

*Omphalia Martensii*, P. Henn., is a small phosphorescent agaric from Borneo, and is in all probability the species alluded to by Dr. Collingwood in Journ. Linn. Soc., Vol. x., p. 469.

*The Saprolegniaceæ of the United States, with Notes on other Species.* J. E. Humphrey; read before Amer. Phil. Soc., Nov. 18th, 1892 (7 pl.).

Dr. Humphrey's excellent work is not only of immense value to American students of the Saprolegniaceæ, but also to those of other countries. The introductory portion, dealing with morphology, etc., embodies the researches of previous workers in this group—carefully individualized—along with his own researches, and indicates what appears to be the true interpretation of the somewhat contradictory statements made by different observers. In the systematic portion the generic and specific characters are ample and clear; several new species and varieties are described. The plates are excellent.

*New Species of Laboulbeniaceæ from Various Localities*, Roland Thaxter, Proc. Amer. Acad. 1893, p. 156.

In the present contribution to a very interesting group of fungi, the author has added eight new genera and fifty-two new species, and the general nature of the work is such that, whatever modifications further research may necessitate, there will be no difficulty in being perfectly certain as to the identity of the organism the author had in view. In two of the new genera described the sexes are separated, and occur upon distinct individuals. An illustrated monograph of the entire group, which the author intimates is now in preparation, will be awaited with interest.

*Fragmenta Mycologica* x.L., P. A. Karsten, Hedw. 1893, p. 59.

Several new species are described, and, unfortunately for science, forms previously described as varieties are now raised to the rank

of species, thus *Stropharia Caput-Medusæ*, Fr., var. *alba*, Karst., Symb., ix., p. 47, becomes *Stropharia alba*, Karst.; *Psathyra permata*, Fr., var. *squamosa*, Karst. Symb., vi., p. 19, is now *Psathyra squamosa*, Karst. *Marsonia Rosæ*, Trail, Sacc. Syll. Suppl., p. 477, is said to be identical with *Actinonema Rosæ* (Lib.), Fr. *Diplonema*, Karst. Finl. Basidsw., p. 430, being previously used for a genus of Algæ, has been changed to *Amphinema*. Finally *Tomentella obducens*, Karst., is said to be the same as *Amphinema sordescens*, Karst.

*On Two New or Imperfectly Known Myxomycetes*, W. C. Sturgis, Bot. Gaz., 1893, p. 186 (1 pl.).—*Comatricha cæspitosa*, n. sp., characterised by the densely cæspitose habit, more or less permanent sporangial wall, and large asperate spores,  $9.6 \times 12.8 \mu$ . The second species is what the author considers to be *Physarum sulphureum*, Alb. and Schw. This may be, but *Physarum chrysotirchum*, B. and C., is certainly not the same, differing in the long, thin internodes of the capillitium, and the much smaller, pale lilac spores.

#### NOTES.

G. Massee has been appointed Principal Assistant (Cryptogamic Department) at the Herbarium, Royal Gardens, Kew.

The annual Fungus Foray of the Yorkshire Naturalists' Union will be held at Howden on Wednesday and Thursday, Sept. 6th and 7th. Mycologists are cordially invited.

*British Fungus-Flora*.—The third vol. of this work, containing the remainder of the Basidiomycetes and the whole of the Hyphomycetes, will be ready in October. The remainder of the species will be published in uniform supplementary volumes.

#### MUSCINEÆ.

*Muscologia Galbica*, T. Husnot. The eleventh part of this important work is to hand, and deals with the following genera:—*Homalothecium*, *Camptothecium*, *Ptychodium*, *Brachythecium*, *Scleropodium*, *Hyocomium*, *Eurhynchium*, *Thamnum*. The specific characters are full and very clear, and the microscopic details in addition to the general habit of the plant, natural size, are given on ten well-executed plates.

*Handbook of British Hepaticæ*.—Under the above title a small volume is now in the Press, by Dr. M. C. Cooke, which is intended for the use of students and those who desire to commence the study of these plants. It will contain about 200 woodcuts, and seven outline plates, with descriptions of all known British genera and species, accompanied by figures. The price will be about five shillings, and it is expected to be ready in October. The publishers are Messrs. W. H. Allen and Co. (Limited), Waterloo Place, S.W.



## NEW OR CRITICAL BRITISH ALGÆ.

BY E. A. L. BATTERS, B.A., LL.B., F.L.S.

**Lithothamnion roseum**, *Nov. Spec.*

Fronds saxicolous, thin, dark pink (never purple), lighter when dry, forming incrustations of indefinite extent, which are at first orbicular and covered with minute wart-like excrescences, afterwards indefinite in outline, the excrescences arising into short, erect, more or less cylindrical, prominent knobs from 5-8 mm. high and from 2-3 mm. in diameter, either simple, or bifid, or trifid above with blunt apices. Tetrasporic conceptacles hardly perceptibly raised above the surface of the frond, much compressed, with numerous orifices. Spores large, 140-200  $\mu$  long, by 80-100  $\mu$  broad, two-parted.

HAB. Berwick. Cumbræ, St. Andrews (C. Howie and Dr. Axford.)

This species is referred to on page 140 of my "List of the Marine Algæ of Berwick-on-Tweed" as being probably distinct from *L. polymorphum*. At the time of writing that note (1889) I was uncertain whether my plant was identical with any described species, and consequently asked the opinion of Dr. Kjellman, who has devoted much time and attention to the study of this genus. He informed me that he regarded the plant as belonging to an undescribed species. I have, however, from various causes, been prevented from describing the plant till the present. My first specimens were gathered at Berwick-on-Tweed, where the plant is far from uncommon. Mr. Holmes informs me he has received specimens from St. Andrews, gathered by Mr. C. Howie and Dr. Axford, and I have little doubt that the species on further investigation will be found at many stations around our coast.

The plant grows on rocks and stones in deep pools, from half-tide level to below low-water mark of ordinary tides. It is usually accompanied by *L. polymorphum*, from which it may at all times be known by its colour, which is never purplish as in that species. At first the crusts are roundish and closely adherent to the substratum, but when old they form wide, irregular patches several feet in diameter, portions of which can easily be detached from the rock. The species appears to be nearly related to *L. colliculosum*, Foslîe, and since Foslîe only found specimens bearing cystocarps it might be questioned whether my *L. roseum* were anything more than the tetrasporic form of that species. I, however, have specimens of a *Lithothamnion*, dredged from deep water near Cumbræ and in other portions of the Clyde sea area, which agree even better with Foslîe's description of *L. colliculosum*, in which the tetraspores are formed in prominent hemispherical or conical conceptacles with a single naked orifice, thus agreeing with the cysto-



carpic conceptacles of that species. *L. roseum* is moreover a much larger and thicker species, the fronds often attaining a diameter of several feet and a thickness of from 3-4 mm.; it also grows between tide-marks, while *L. colliculosum* appears to be a deep-water species. Specimens of *L. roseum* have been distributed in the sixth part of Mr. Holmes's excellent "*Algæ Britannicæ Rariores Exsiccatæ*," an account of which will be found below.

**Pleurocapsa fuliginosa**, *Hauck Meeresalgen Deutschland und Oesterreichs*, p. 515, fig. 231.

Cell division taking place in all directions; cells yellowish or reddish-brown, from 5-20  $\mu$  in diameter, spherical or irregular in shape, with a thin investing membrane, solitary or united in clusters of 2-7 individuals. Cell contents homogeneous, breaking up when mature into numerous spores.

At Berwick this plant forms a thin brownish layer on rocks at high-water mark, and is usually accompanied by *Calothrix scopulorum* and other small algæ.

**Aphanocapsa marina**, *Hansg. in Foslie Contrib. to Knowledge of Mar. Alg. of Norway*, I., p. 169. *Hauck and Richter, Phykotheka Universalis*, x., No. 486.

Cells roundish, seldom more than 5  $\mu$  in diameter, blue-green, solitary or united in twos, in a colourless jelly. Cell membrane very thin. Layer dirty green, darker when dry.

I have found this species at Berwick, where it appears to be not uncommon, growing on rocks at and above high-water mark, mixed with species of *Calothrix* and other small algæ.

**Protococcus marinus**, *Kütz. Phyc. Gener.*, p. 169. *Tab. Phyc.*, I., t. 2.

Cells mostly solitary, roundish, from 10-30  $\mu$  in diameter. Cell contents brownish red, turning to a light greenish tint when dry.

Mixed with *Calothrix scopulorum*, on rocks near high water mark. Weymouth.

**Protococcus ovalis**, *Hansg. in Foslie Contrib.*, I., p. 159.

Vegetative cells oval or elliptical, more rarely roundish, mostly 5-10  $\mu$  broad by 10-12  $\mu$  long. Cell contents homogeneous, light green. Layer thin, dirty green.

Weymouth. On rocks and stones at high-water mark and between tide marks.

**Plectonema terebrans**, *Bornet et Flahault sur quelques plantes vivant dans le test calcaire des mollusques in Bull. Soc. Bot. de France*, t. xxxvi., pl. x., figs. 5 and 6.

Filaments very slender, elongated, flexuous, commonly sparingly pseudo-branched, pseudo-branches most frequently solitary. Sheaths hyaline, very thin, cylindrical, not turning blue when treated with chlorzine iodine. Trichomata pale green, not torulose, 0.95  $\mu$  to 1.5  $\mu$  thick; joints longer than the diameter of the trichomata, 2  $\mu$  to 6  $\mu$  long; each dissepiment marked with two grains of protoplasm, apical cell rounded.

Mixed with various other species of perforating algæ in old shells from Cumbræ. I am indebted to the kindness of Dr. Bornet for the identification of this species. I find that the plant is far from uncommon on our shores, as I have also found it abundantly on old shells from Weymouth and elsewhere; externally the shells give no indication of the presence of the *Plectonema*, which is only brought to light when the chalk of the shell has been dissolved.

**Symploca atlantica**, Gomont, *Monographie des Oscillariées*, Ann. Sc. Nat. Bot., t. XVI., p. 109.

Cæspitose, black green. Fasciculi erect, reaching one centimetre high. Filaments closely interwoven, free, simple, strongly and angularly torulose. Sheaths thin, firm, turning blue when treated with chlorzinc iodine. Trichomata yellowish-green, 4-6  $\mu$  thick, constricted at the joints throughout their entire length, cells usually square or shorter than long, rarely longer than broad, 2-6  $\mu$  long, protoplasm scarcely granulose; dissepiments visible, pellucid, not granular; membrane of the apical cell thickened into a depresso-conical calyptra (n.v.)

HAB. Shores of Wales (Nordstedt).

The above description is translated from M. Gomont's description of the species. I have not had an opportunity of seeing a specimen, and record the species as British, on the authority of M. Gomont, who has received specimens gathered on the shores of Wales by Dr. Nordstedt. We are not told the exact locality in Wales where the plant was found.

**Lyngbya lutea**, Gomont, *Essai de classification des Nastocacées homocystées* in Morot, *Journal de Botanique*, IV., p. 354.

Stratum sub-gelatinous, coriaceous, yellowish-brown or olive-green, when dry often blackish violet. Filaments twisted, flexuous, closely interwoven. Sheaths hyaline, smooth, turning blue when treated with chlorzinc iodine, at first thin, when old up to 3  $\mu$  in thickness and lamellose. Trichomata olive-green, not constricted at the joints nor attenuated at the apices, 2.5-6  $\mu$  thick; cells quadrate or up to three times shorter than long, 1.5  $\mu$  to 5.5  $\mu$  long, protoplasm granular, dissepiments usually compactly drawn together. Apical cell furnished with a rounded calyptra.

In shallow puddles of salt water at high-water mark, Puffin Island and Cumbræ. This species greatly resembles *Lyngbya semiplena* in outward appearance, but, as M. Gomont remarks, is sharply separated from it by the smaller diameter of the filaments, the greater length of the joints, and the reaction of the sheath in the presence of iodine.

**Phormidium fragile**, Gomont, *Monographie des Oscillariées*, l.c., p. 163.

Stratum slimy, lamellose, yellowish or brownish-green. Sheaths dissolving to a fibrous, gelatinous mucus, which does not turn blue when treated with chlorzinc iodine. Trichomata more or

less flexuous, bright green, variously intertwined or sub-parallel, moniliform, attenuated at the apex,  $1.2-2.3 \mu$  thick; joints sub-quadrangle,  $1.2-3 \mu$  long, protoplasm not granulose, apical cell sharply conical; no calyptra.

In shallow pools of brackish water, Point of Ayr, Flintshire.

**Ascocyclus ocellatus**, Rke., *Algenfl.*, p. 46, *Atlas t.* 15.

Spots from 1-6 mm. in diameter. Basal disc composed of concentric zones. The central portion two layers thick is succeeded by a zone of frond composed of a single layer of cells; this is again succeeded by a two-layered zone, and so on. Vertical filaments and sporangia arise only where the frond is composed of two layers. Filaments about  $8 \mu$  in thickness, plurilocular sporangia lanceolate, stalked.

On the fronds of *Rhodymenia palmata*. Weymouth; local, but abundant.

This species bears a very striking resemblance to *Ascocyclus reptans*, Rke., from which it is sharply separated by the nature of the basal disc.

**Myriotrichia repens**, Hauck, *Beiträge zur Kenntniss der Adriatischen Algen*, *Österr. botan. Zeitschr.*, 1879, p. 242, *tab.* 4, *figs.* 1 and 2.

Fronds microscopical. Filaments 200-500  $\mu$ , creeping amongst the cortical filaments of *Mesogloea*. The primary threads irregularly branched, 6-8  $\mu$  thick; joints from as long as broad to twice as long. The upright filaments 9-15  $\mu$  thick, simple, the apices ending in two or more hairs; joints  $1\frac{1}{2}$ -4 times longer than the diameter. Unilocular sporangia 20-30  $\mu$  in diameter, borne either on the creeping or upright filaments. Plurilocular sporangia clustered at the apices of the erect filaments, more or less cylindrical, 30-40  $\mu$  long, 6-9  $\mu$  broad. Unilocular and plurilocular sporangia borne on the same individuals.

Weymouth. T. H. Buffham.

Mlle. Karsakoff has demonstrated that it is unnecessary to retain the genus *Dichosporangium*, founded by Hauck, for the reception of this minute species. I have, therefore, retained the earlier name conferred on it by its discoverer. Although up to the present Mr. Buffham has only found a single patch of this species on *Castagnea Griffithsiana*, we may anticipate that it will be found at many stations around our coast, its minute size having hitherto protected it from discovery.

**Stilophora tuberculosa**, Rke. *Algenfl.*, p. 72, *Atlas i.*, 37.

Very closely related to *Stilophora rhizodes*, J. Ag., but coarser in habit and darker in colour, and the bases of the branches thicker. The sori are so closely placed that they touch one another, thus covering the whole surface of the thallus, very little if any of the unaltered cortical layer of the thallus being visible in fertile specimens. The central filaments of the sori are longer



than those near their edges, thus giving to the frond a rough warted appearance. The unilocular and plurilocular sporangia are sometimes found on the same individual.

Swanage. E. M. Holmes.

#### BIBLIOGRAPHY.

*Algæ Britannicæ Rariores Exsiccatae*. Curante E. M. Holmes. Fasciculus iv., Nos. 126-150.

The contents of the sixth part of this excellent collection of exsiccata is, as the just confidence we place in Mr. Holmes' judgment and skill in the task of selection would have led us to expect, of exceptional interest to all those interested in the study of our marine flora. We note with pleasure that Mr. Holmes has introduced several improvements into the present part; for instance, the labels which accompany the specimens have each printed on them either at the top or side "Holmes' Alg. Brit. rar. Exsicc.," thus enabling those who distribute the specimens in large Herbaria to at once detect the source whence they were derived. The *Melobesia* and other lumpy specimens have also been placed in shallow boxes, which is a most decided advantage, as it prevents these brittle plants from being injured by the pressure of the specimens overlying them. With regard to the specimens themselves, No. 126 is certainly the *Ascocyclus orbicularis* of Magnus, Hauck, and Reinke; but whether or not it is the *Myrionema orbiculare* of J. Agardh I am unable to say. His description ("Species Algarum," p. 48) does not agree very well with our plant. The sentence "Ex strato hoc basali surjunt sparsissima fila clavata, intermixtis hyalinis confervoideis elongatis" is hardly applicable to the *A. orbicularis* of Magnus or Hauck. I am equally uncertain whether the *Myrionema orbiculare* of the Brothers Crouan and French authors generally is referable to the *Ascocyclus orbicularis* of Magnus. Reinke ("Algenflora der Westlichen Ostsee," p. 46) quotes the Crouans' figure ("Florule du Finistère," p. 25, 165, Fig. 7) as authority for saying that the plurilocular sporangia of *Ascocyclus orbicularis* are sessile. I presume, therefore, that he considers the *M. orbiculare* of the Crouans as identical with *A. orbicularis* of Magnus. Neither J. Agardh\* nor the Cronans make any mention of the unicellular, thick-walled, hyaline utricles which are so conspicuous a feature in *A. orbicularis*, giving to the dried specimens a hoary appearance which alone renders them visible to the naked eye. A reference to the Cronans' plate shows that their plant much more nearly resembles *A. jæcundus*, var. *seriatus*, Rke., if it is not actually identical with it. It may well be, then, that J. Agardh's *Myrionema orbiculare* is

\* Agardh's "fila . . . , intermixtis hyalinis confervoideis elongatis" would seem to refer to the hyaline hairs, not the utricles which he would hardly have described as confervoid.



identical with the variety *seriatus*, Rke., of *A. fœcundus*, while Magnus's plant was unknown until the appearance of his description. In that case, unless the genus *Phycocelis* of Strömfelt be retained, the plant described by Magnus must receive a new specific name. No. 127.—*Ascopyllum Mackaii*, Holm. et Batt., var. *Robertsoni*, Batt. I am now of opinion that it would be better to raise this variety to specific rank, as it appears to be separated from *A. Mackaii* by more essential characteristics than those which separate *A. Mackaii* itself from *A. nodosum*.—No. 130. *Chordaria divaricata*. With the exception of the Irish specimens described by Harvey and those "found floating in Plymouth Harbour by Mr. F. Pascoe" (Johnstone and Croall, "Brit. Sea-weeds," p. 110.), I know of no specimens of this species having been found on the shores of these Islands previous to Mr. Holmes' "find" at Fairlie.—133. *Ectocarpus crinitus*, Carm. Mr. Holmes would keep this species distinct from *E. pusillus*, Harv. (*Akinetospira pusilla*, Born.), No. 136, as apart from the difference in habit between them the two plants grow in very different situations. *E. crinitus*, Mr. Holmes informs me, "was found growing in large masses covering a space of a square yard or more near high-water mark, over *Cladophora rupestris* and *Enteromorpha*, and below *Rivularia Biasoletti*, on the perpendicular face of a rock in the shade, over which moisture trickled, while *E. pusillus* was found in very shady pools forming isolated small tufts."—135. *Ectocarpus ovatus*, Kjellm. Although the specimens of this species contained in the fasciculus are small, they are amply sufficient for identification. The plant appears to be very rare, as up to the present only two specimens have been found, one at Weymouth and one at Ilfracombe. The specimens are very difficult to lay out, as the clustered fruits render the threads liable to catch in one another.—No. 137. *Ectocarpus Sandrianus*, Zan. The first British specimens of this species were found by Mr. F. W. Smith growing on a specimen of *Desmarestia aculeata* thrown upon the beach at Falmouth, and were communicated by him to Mr. Holmes. Since then the species has been found by Mr. and Mrs. Holmes at Studland, Ilfracombe, and Taunton.—No. 144. *Monostroma Blytii*, Wittr. This species was first found on our shores by Mr. Holmes in 1890 at Tayport, subsequently by myself at Cumbræ, and lately by Mr. J. T. Neave at Deal.—No. 149. *Schizothrix lardacea*, Gom. Although M. Gomont himself, we are informed, identified the specimens which are here distributed, he makes no mention of the plant occurring in England in his "Monographie des Oscillariées."—No. 150. This is *Myriactis Areschougii*, Batt.; the generic name is wrongly given as *Streblo-nema* on the label. The fasciculus contains several other species of interest, and Mr. Holmes is certainly to be congratulated on having got together a most interesting and useful set of specimens. *Phycological Memoirs*. Edited by GEO. MURRAY, F.R.S.E., F.L.S.

Although a longer period than is altogether desirable has elapsed since the appearance of the first part of the "Phycological Memoirs," the second part is none the less welcome, more especially as it fully sustains the reputation obtained by its predecessor. The plates, printing, and whole "get up" of the part are admirable, and the volume, when completed, will, we may anticipate, be worthy of the great institution within whose walls the researches, the results of which it records, have been made. The first paper in the present part deals with some obscure points in the morphology of the *Fucaceæ*, which had been left untouched in Oltmann's rather disappointing monograph of that order. *Coccophora Langsdorffii*, Grév., and *Seirococcus axillaris*, Grév., are figured, and their structure described in a very interesting paper by Miss Lorrain Smith, while a similar service is performed for *Xiphophora Birlardierii*, Mont., by Miss Barton, for *Notheia anomala*, Bail. et Harv., by Miss Mitchell, and for *Sarcophycus potatorum*, Kütz., by Miss Whitting. The figures of these plants are well and accurately drawn, and the descriptions sufficient, and the papers are welcome as gathering together, in an easily accessible form, all the information we possess with regard to these little-known plants. Taken in conjunction with the paper on *Splachnidium rugosum*, Grév., by Miss Mitchell and Miss Whitting, these notes clear up much that was formerly obscure in this fucoid group. The next paper is devoted to the description of a new endophyte—*Chlorocystis sarcophyci*—which, together with the distorted tissues of the last plant, forms gall-like excrescences on the fronds of *Sarcophycus potatorum*, Kütz. These excrescences were first noticed by Mr. Bracebridge Wilson, who, finding they were caused by an unicellular alga, sent specimens for investigation to the British Museum. Miss Whitting has carefully examined the material sent, and has come to the conclusion that the endophyte belongs to the genus *Chlorocystis*, but to a species hitherto unknown. The diagnosis of the new species is as follows:—"Cellulis globosis oblongis vel irregularibus, 10-40  $\mu$  diam., in statu vegetativo viridibus, in matrice omnino inclusis, collo destituto, zoogonidia emittentibus. Hab. in *Sarcophyci* frondibus ad oras Novæ Hollandiæ propi Geelong. Coll. J. Bracebridge Wilson." The third paper, by Geo. Murray, deals with the closely related genera *Halicystis* and *Valonia*. After giving an account of the geographical distribution of *Halicystis ovalis*, Mr. Murray translates some very careful and interesting notes on that species, furnished by Professor F. Schmitz. Dr. Schmitz finds that the chromatophores of *Halicystis ovalis* are roundish or oval discs of somewhat varying size and rounded outline, never sharply angular or lobed, and wholly without pyrenoids. The nuclei are very numerous and minute, and are scattered amongst the chromatophores. Speaking of the characters which distinguish *Halicystis* from *Valonia*, Dr. Schmitz continues: "The nuclei of *Valonia* are much more compact and more evenly distributed at fairly regular distances in

the protoplasm. The chromatophores exhibit an irregularity of shape, being roundish, but angular, some of them with sharp angles, and of varying size; moreover, some of them are provided with pyrenoids, and these are of regular occurrence among the others which have no pyrenoids." He considers these differences in combination with the non-development of rhizoids, and the cell-membrane so little stratified as to exhibit no exfoliation completely justify the separation of *Halicystis* and *Valonia*. Dr. Schmitz, however, admits another species into the genus *Halicystis*. This new species, *H. parvula*, is smaller than *H. ovalis*, with a shorter and more blunt stalk, a more uneven surface, but differs from *H. ovalis* mainly in having larger chromatophores of a long spindle shape, and, judging from the figure, rather angular outline, "provided in the centre with a single clear pyrenoid." From the last sentence it would appear that Dr. Schmitz places no reliance on the presence or absence of pyrenoids in the chromatophores as a generic character separating *Valonia* and *Halicystis*. On the whole we think Mr. Murray is wise in preferring "the more cautious attitude of awaiting the story of the reproduction" of *Halicystis* before committing himself to full agreement with Dr. Schmitz's views as to its distinctness from *Valonia*. To us the real interest of the paper is to be found in the fact that Mr. Murray has found on *Valonia ventricosa*, J. Ag., what appear to be reproductive cells. These bodies, Mr. Murray says, have plainly arisen by free cell formation within the great mother-cell. They are of various sizes, and, while generally round, odd forms are to be met with, dumb-bell shaped in varying degree, and others suggesting a process of sprouting in yeast fashion." Attempts to cultivate them proved unsuccessful. The part also contains an interesting paper on the structure of *Hydroclathrus*, Bory, by Miss Mitchell, and one on the cryptostomata of *Adenscystis*, *Alaria*, and *Saccorhiza* by Mr. Murray, and finally a comparison of the marine floras of the warm Atlantic, Indian Ocean, and the Cape of Good Hope, by the same author. As we have already said, the papers in the present part are interesting and useful, and want of space alone has prevented us from dealing with them more fully, while the plates, paper, and printing are all that can be desired. We heartily trust that this work will meet with the encouragement which it deserves.

*A Provisional List of the Marine Algæ of the Cape of Good Hope.*

By Ethel S. Barton ("Journal of Botany," February-July, 1893).

Miss Barton has performed a useful and much-needed work in preparing a list of the marine algæ of the Cape of Good Hope. The only other list dealing exclusively with the marine algæ of that region known to us is the already antiquated "*Phycea Capenses*" of Areschoug, published in 1851, and which is of course very incomplete, as much work has been done since then.



Miss Barton has had, at the outset, to meet an undoubted difficulty in studying the subject because of the great labour involved in the collection and verification of records, and she most certainly deserves the thanks of all algologists for the thorough manner in which she has performed her self-imposed task. We could have wished, however, that she had adopted a classification more in accord with modern research, and we must own that we entirely fail to see how the adoption of that course would "have presented difficulties in tabulating and comparing the Cape marine flora with other floras and destroyed the chief interest—that of geographical distribution—of such lists as the present." A reliable table of distribution can only be drawn up from a comparison of specimens collected in the regions the floras of which are to be compared. A table compiled from "lists" only is apt to be very misleading, as it is always more or less uncertain whether the *same species* is indicated by the *same name* when used by two different authors, resident, perhaps, in widely separated countries, who have had no opportunity of comparing their specimens with type or even authentic ones. Three new species are described in the list, but we fear few algologists are likely to recognize them from the descriptions, which are very incomplete. *Carpoblepharis minima* seems to be separated from *C. flaccida*, Kutz., simply by its minute size. The description of *Spermothamnion Schmitzianum* is equally applicable to several species of *Spermothamnion*, and one may be permitted to doubt whether it is really distinct from *S. repens*. Putting these minor points out of consideration, however, the work is well done, and we trust that before long Miss Barton will prepare a revised edition of her list.

*Die Algen der Kieler Föhrde.* By Th. Reinbold (from "Schriften des natur wissen schaftlichen vereins für Schleswig-Holstein").

The fourth and concluding part of Major Reinbold's valuable little book is a welcome addition to the literature dealing with the Baltic marine flora. It may be said to form an introduction to Prof. Reinke's "Algenflora," in which no descriptions of the species are given, and the size of which renders it unsuitable for everyday use. The descriptions are succinct and to the point, and the book will prove useful not only to Major Reinbold's own countrymen, but to Englishmen and others resident in countries where many of the new or little known species may be expected to occur.

*Sur les Algues d'eau douce récoltées en Algérie.* By M. C. Sauvageau ("Bulletin de la Société Botanique de France," Vol. xxxix.).

Although the Phanerogams and even the marine algæ of Algeria have attracted some sort of attention from botanists, no account, other than that given by Montagne, many years ago, is to be met



with of the fresh-water algæ of that district. M. Sauvageau's list to some extent supplies this want; he mentions 60 species, some of which belong to new genera or species. The new genus *Synechocystis* differs from *Synechococcus* in possessing perfectly globular cells. *Tapinothrix*, n. gen., is thus described: "Fila heterocystis destituta, tenerrima, simplicia, a basi leviter incrassata attenuata apice in pilum articulatum non producta, vaginæ tennes, arcissimæ, continuæ, sæpissime sursum, hormogoniorum exitu, vacuæ." A single species, *T. Borneti*, with filaments 150-300  $\mu$  long, 4  $\mu$  broad at the base, and 1.5  $\mu$  above, is described. New species of *Entophysalis*, *Dermocarpa*, and *Synechococcus* are described. The paper is accompanied by an excellent plate.

## MODERN MYCOLOGY.

By G. MASSEE.

In an article recently published by Professor Saccardo,\* the total number of known plants is given as 173,706, distributed approximately as follows:—

Phanerogams	...	...	...	...	105,231
Filices	...	...	...	...	2,819
Equisetaceæ, Marsiliaceæ, Lycopodiaceæ	...	...	...	...	565
Musci	...	...	...	...	4,609
Hepaticæ	...	...	...	...	3,041
Lichenes	...	...	...	...	5,600
Fungi	...	...	...	...	39,663
Algæ	...	...	...	...	12,178
Total	...	...	...	...	173,706

Confining our remarks for the present to the fungi, we find that, according to Steniz,† the number of known species in 1862 amounted to 11,890, whereas the number described in Saccardo's "Sylloge Fungorum," 1892, amounts to 39,663.

In endeavouring to account for this enormous increase in the number of species during the last thirty years, four factors are at once recognized as being of primary importance in this connection: (1) perfection of the microscope; (2) exploration of new regions; (3) imperfect descriptions of species; (4) Saccardo's "Sylloge Fungorum."

Examined in detail, it is found that the four factors have

\* "Il numero delle piante;" Atti del Congresso Bot. Inter. di Genova; p. 57 (1892).

† "Nomenclature des Champignons."

respectively influenced the study of systematic mycology somewhat as follows :—

(1.) The large sections of fungi known as the Pyrenomycetes and the Hyphomycetes were—when recognized at all by the old authors—classified according to naked eye, or, at the most, pocket lens characters. It has been shown in hundreds of instances, where external characters alone did not suggest a specific difference between two given organisms, that the compound microscope has clearly demonstrated differences which are accepted at the present day as being of generic or even ordinal value, and thousands of species belonging to the above-mentioned and other groups, coming under the category of micro-fungi, have been added during the last thirty years, resulting entirely from the modern perfection of the microscope. As would be expected, all this array of modern species are not equally good, and the abuse—as we consider—in the use of the microscope in connection with the tremendous increase of species will be considered at a later stage.

(2.) The attention paid to fungi by botanical collectors in almost every part of the world during late years has added materially to the number of previously known species. At the same time, it is perfectly certain that hundreds of species founded on dried specimens, too often received without a word of information as to habitat, structure, colour, etc., will never be recognized again from the necessarily meagre descriptions given, and hence will arise a duplication of names, the same species being received a second time under more favourable conditions as to preservation, accompanying information, etc., being found to present characters differing from any known form, will be described as a new species. This difficulty could be completely overcome by not founding species on imperfect material, but, apparently, all who have to deal with exotic collections received in a dry state do this to some extent, hence, in place of recrimination, the thing that suggests itself is—don't do it again.

(3.) So long as a specific diagnosis does not contain an absolute error, perfect and imperfect appear to be relative terms, depending entirely on personal opinion ; and brevity being considered by the great majority as a cardinal virtue, factors that are looked upon as being of minor importance are not unfrequently entirely omitted from a diagnosis. It not unfrequently happens that the one or more features considered as of prime importance by one person or clique are almost entirely ignored by the followers of a second system, and *vice versa* ; hence crops up a grave difficulty, each party is endeavouring to understand the species of the other by the use of one or more characters in the value of which, comparatively speaking, no confidence is placed. As an illustration of the above, the Friesian school of mycologists consider that for the correct identification of a species of *Agaricus* a detailed account of pileus, gills, and stems is necessary, the weak point—until quite recently

—being spore measurements. Bresadola,\* on the other hand, in his bulky work on the Hymenomycetes, makes the spore the one crucial feature in a specific diagnosis, all other characters being treated in a very superficial manner. The illustrations, too, in the last-named work are very novel; the fact of their occurrences in a mycological work suggests that they are intended to represent fungi, otherwise in many instances there is no obvious reason for supposing this to be so. In the case of old authors dealing with micro-fungi, their diagnoses were incomplete from no fault of their own, but at the present day, whatever opinion is entertained as to the relative value of certain features, which could be emphasized by italics, it would be wise to carefully describe all the structural features possessed by a given species, the leading idea being that the specific character should enable the species to be recognized by any mycologist, and not only intelligible to a favoured few, who presumably have reached what may be termed the scientific astral plane of one particular clique. Most mycologists are undoubtedly ready to admit that hundreds of book-species do not exist in nature; also that there is a considerable duplication of names and general mixing up and confusion of species in almost every group of fungi, brought about by the reasons indicated above, also others, and it is becoming more and more obvious day by day that the present state of things cannot go on for ever, but that sooner or later the bull must be taken by the horns. We must endeavour as far as possible to redeem the study of mycology from its present corrupt condition, and place it on a sound basis. This, however, can only be the outcome of combination and of proceeding in a methodical manner. Bearing on imperfect description of species, the following ideas could be carried out:—(a) Careful new descriptions from the present stand-point of knowledge of all existing type-specimens, both ancient and modern, if it is felt that any points of importance have been omitted in the original diagnosis; (b) The discarding of all old names where the description is admittedly too meagre and imperfect for recognizing the species with certainty and no type-specimen exists; this will be considered as a cruel suggestion to a limited few mycologists, whose mixture of egotism and vanity prompts them to believe that they know in every instance exactly what species the old authors had in view; (c) let all future descriptions so thoroughly cover the species intended that under ordinary circumstances no doubt could be entertained as to the species the founder had in view.

(4.) The effects of Saccardo's stupendous work† are apparent in all recent works on mycology, and perhaps to the greatest extent in extra European countries. As indicated by the title, this work is supposed to contain a description of every known fungus up to the date of issue, and taking into consideration the great difficulties to be met in an endeavour to sweep up the

\* "Hymenomyceten aus Südbayern."

† "Sylloge Fungorum omnium hucusque cognitorum," (1882—1892).



enormous accumulation of mycological literature, frequently published in periodicals having a very local distribution, there are comparatively few omissions, and many of these are in reality owing to no fault of the author, but to the practice of describing species in private or official publications which cannot be purchased in the usual way; as examples of such may be mentioned the many "reports" and "bulletins" emanating from the United States of America. Many of the imperfect references in the "Sylloge"—although not all—are due to the highly reprehensible practice of altering the original pagination in extracts, and omitting to state the volume or even the source of the extract; such omissions, apparently insignificant in themselves, are certain sooner or later to lead to mistakes and consume much time, and need not necessarily recur if a minimum amount of thought and care is exercised.

This same completeness has apparently led some mycologists to believe that what is not contained in Saccardo's work must necessarily be new and undescribed, and act accordingly; furthermore, this idea is probably to a very great extent true, but then arises the question, who knows exactly what is described? The diagnoses of many authors are more remarkable for brevity than lucidity, the result being that very often on the same page in the "Sylloge" we find one species described in the space of two or three lines, and in such a vague manner that in the absence of the type specimen it is an absolute impossibility to form any idea as to the nature of the fungus the author had in view. Following an example of the kind just indicated, we come across a diagnosis containing all the information the present state of knowledge enabled the author to put into it. This heterogeneous mixture is not due to any laxity on the part of the author, whose primary object was to bring together all published descriptions of fungi; and moreover, to our own knowledge, Saccardo has endeavoured and succeeded in obtaining revised descriptions of numerous species, where the original diagnosis was inadequate; yet unfortunately, hundreds of absolutely useless descriptions of species are yet included in the work, presumably because, owing to the absence of type specimens, amended descriptions could not be obtained. As already suggested, a good plan would be to expunge the names of all species from the list of fungi where the description is obviously imperfect, and no type specimen is known to exist, as it is as great an injustice to credit an individual with the founding of a species of which in reality he had no knowledge, as to deprive him of the credit of establishing a species undoubtedly his own.

Ellis and Everhart appear to have realized some of the difficulties stated above, as in the introduction to "The North American Pyrenomycetes," probably the best book on systematic mycology ever published, we read as follows: "In the present state of mycological knowledge, the classification

(To be continued.)



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